

AD719130

29 December 1967

Materiel Test Procedure 8-4-004
Dugway Proving Ground

U. S. ARMY TEST AND EVALUATION COMMAND
ENVIRONMENTAL TEST PROCEDURE

LONG TERM SURVEILLANCE/ENVIRONMENTAL
TESTING OF CBR MUNITIONS, WEAPONS AND EQUIPMENT

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1. OBJECTIVE

The objective of this materiel test procedure (MTP) is to present general procedures required to determine the effects on the test item of long term storage under various environmental conditions. The test and evaluation procedures will follow applicable Qualitative Materiel Requirements (QMR's), Small Development Requirements (SDR's), Technical Characteristics (TC's), or other requirements and documentation that pertain to a particular test item.

2. BACKGROUND

Long term surveillance tests of materiel in storage under various natural environmental conditions are made to determine the extent of deterioration as compared with original requirements expressed in QMR's or other directives. These tests are of particular importance for: (1) equipment designed for the protection of personnel and containing materials subject to rapid deterioration such as rotting, softening, hardening, cracking, and leaking; (2) munitions and weapons containing toxic, corrosive, and explosive compounds which tend to change in character and performance more rapidly than inert materials; (3) sensitive materials and devices used for contamination surveys and tests; and (4) chemical and biological detection and warning equipment containing reagents which are susceptible to deterioration.

Environmental tests under simulated climatic extremes are an integral part of normal engineering tests. These tests include accelerated storage surveillance in induced environmental extremes and under local environmental conditions at the test site when required by the nature of the test item. Testing in extreme natural climatic environments is used to substantiate or supplement data obtained from simulated tests.

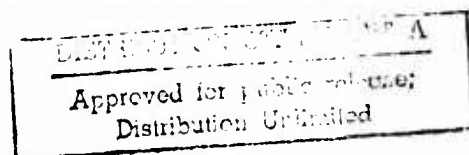
Results of these environmental tests will contribute data necessary for type classification or reclassification, and information essential for long range planning, procurement, and stockpiling of CBR materiel.

3. REQUIRED EQUIPMENT

- a. Equipment required will be determined by the nature of the item undergoing surveillance testing and will, in general, be the equipment listed in the "Required Equipment" paragraph of the applicable commodity MTP and the "Support Requirements" paragraph of the commodity plan of test.
- b. Storage facilities normal to the climatic environment of the test site or as stipulated by the QMR or other directive, will be required.
- c. Applicable presentation equipment as determined in paragraph 6.2.2.
- d. Applicable equipment for making the required meteorological

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observations of paragraph 6.2.4.

4. REFERENCES

- A. USATECOM Regulation 705-4, Equipment Performance Report.
- B. AR 705-15, Operation of Materiel Under Extreme Conditions of Environment, with Change 1, 14 October 1963.
- C. MTP 8-4-001, Desert Environmental Test of Chemical, Biological and Radiological Equipment.
- D. MTP 8-4-002, Arctic Environmental Test of Chemical, Biological and Radiological Equipment.
- E. MTP 8-4-003, Tropic Environmental Test of Chemical, Biological and Radiological Equipment.
- F. MTP 8-2-500, Receipt Inspection.
- G. MTP 8-2-509, Radiography.
- H. MTP 8-2-510, Decontamination.
- I. MTP 8-2-511, Leak Testing of Protective Equipment.
- J. MTP 8-2-512, Leak Testing of Agent-Filled Munitions and Containers.
- K. MTP 8-2-513, Dissemination Characteristics, CB Munitions/Dissemination Devices.

5. SCOPE

5.1 SUMMARY

The procedures outlined in this MTP provide general guidance for the conduct of long term surveillance/environmental testing, and are applicable in some degree to all materiel subjected to such tests. Specific procedures and testing requirements will be determined by the discrete characteristics and performance criteria of the particular test item.

The following procedures shall be performed to the extent and in the detail required to determine if the test item meets the criteria established:

- a. Receipt Inspection - An inspection of the test item, as received, to: (1) determine its physical conditions; (2) locate any defects which may have an adverse effect or become more serious as the test progresses; (3) identify damage received during transport; (4) confirm completeness of shipment; and (5) apply (or verify) sequential markings for subsequent identification.
- b. Graphic Requirements - A study to establish minimum requirements for pictorial and other graphic records of test conditions and test results.
- c. Cyclic Schedule - A study to define the requirement for preparation of a cyclic schedule of tests, and adherence to the schedule.
- d. Meteorological Data - A study to establish the requirements for meteorological record keeping during storage and testing, and define the meteorological conditions suitable for testing of the item.
- e. Pre-Storage Tests - A study to establish pretest performance data for use as criteria in checking satisfactory performance of the test item during and at the conclusion of the test.
- f. Storage - A study to define the conditions for environmental storage.

g. Cyclic Inspections and Tests - A study to define the general nature of inspections and tests required during each cycle of the scheduled tests.

5.2 LIMITATIONS

This MTP is limited to general procedures for surveillance/environmental testing applicable to all CBR commodities. Specific tests for the various categories and types of equipment are not included.

6. PROCEDURES

6.1 PREPARATION FOR TEST

6.1.1 Safety

a. Test and subtest plans and procedures shall ensure performance in the safest manner consistent with accomplishing the mission. The cardinal principle is to limit exposure of a minimum of personnel, for a minimum time to a minimum amount of hazardous material consistent with safe and efficient operations. Plans shall include safety procedures, precautions, protections, and emergency procedures as necessary. Technical information on the hazards and safety characteristics of the test item as provided by the Safety Statement (see Glossary) and other pertinent information shall be included. Such information shall include evaluation of potential hazards, analysis of risks, limitations, and precautions including special test equipment and techniques that should be incorporated in test plans and procedures.

b. Each test site shall be responsible for safety of conduct of tests at that installation. A local safety SOP shall be prepared and submitted to the USATECOM safety office of that installation for each test item, and testing shall not begin until the safety SOP is approved by the USATECOM Safety Officer.

c. All personnel who participate in or observe the tests shall be briefed on the hazards involved and proper procedures.

6.1.2 Security

Security considerations shall be adequately determined and provided for as applicable.

6.1.3 Logistical Considerations

a. The plan of the test shall contain detailed guidance for maintenance and repair of the test item. In addition, guidance shall be included as to what will and what will not be considered a reportable failure within the scope of USATECOM Regulation 705-4.

b. Upon receipt of notification that materiel is to be shipped to a test facility for long term surveillance/environmental tests, the test facility shall make such advance arrangements as may be necessary for the receipt, storage, and testing of the item in the quantity specified.

c. The plan of test shall be reviewed to determine that quantities allocated for surveillance/environmental tests are adequate for tests of the specific type commodity, and that quantities required for operational and functional tests are sufficient to demonstrate reliability of the item under surveillance.

6.2 TEST CONDUCT

6.2.1 Receipt Inspection

The test item shall be subject to the applicable procedures of MTP 8-2-500 following its arrival at the test site with emphasis on the following:

- a. Completeness of shipment and accuracy of shipping list as compared to shipping notification and test directive.
- b. Inspection and processing of damaged items.
- c. Sequential marking for scheduled cyclic tests.

NOTE: Unpacking shall be done only to the extent required by the test requirements and the nature of the test item.

6.2.2 Graphic Presentation

To the extent possible, test planning shall include general and specific requirements for the graphic presentation of test conditions and test results. When applicable and/or as required by the test conditions and results, the following shall be included:

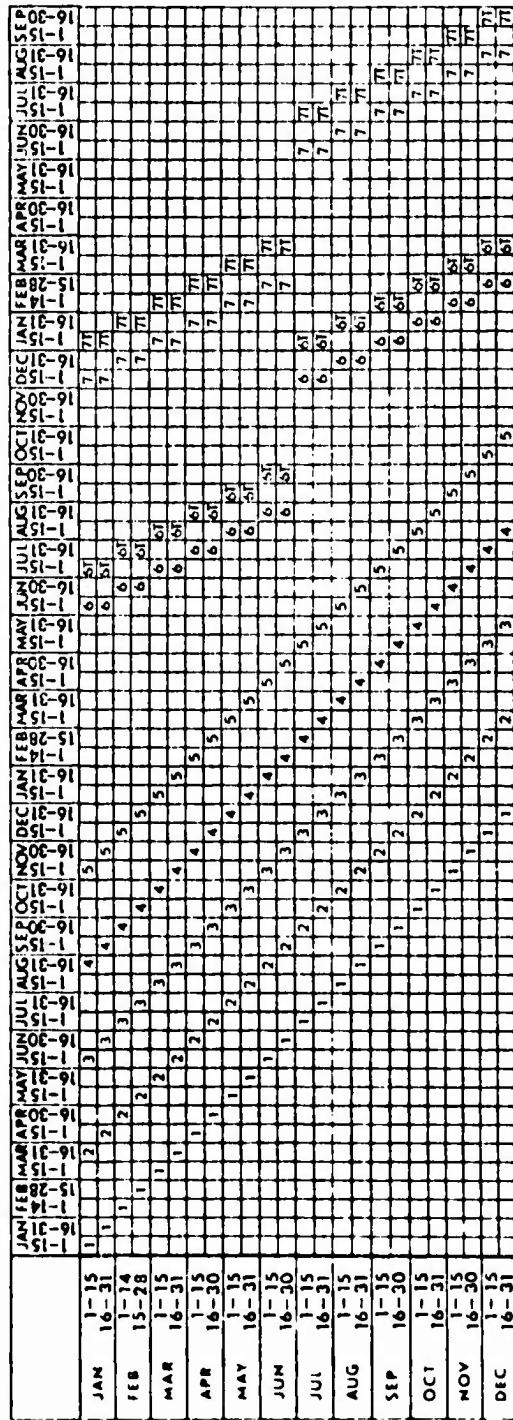
- a. Still photographs, black and white or color
- b. Motion pictures, black and white or color
- c. Radiographs
- d. Sketches
- e. Diagrams
- f. Maps
- g. Charts
- h. Graphs
- i. Other pictorial or graphic presentations

6.2.3 Cyclic Scheduling

The test plan shall include a schedule of projected cyclic inspections and tests to cover the entire period of the surveillance environmental tests (see Figure 1).

NOTE: The total time period for the storage surveillance and the time intervals between cyclic inspections and tests shall be based on current policy for such tests and the QMR or other applicable directives.

6.2.4 Meteorological Data



Notes:

1. Use of Chart. The half-months in which cyclic tests would be scheduled may be determined by reading the chart from left to right, from introduction of item into program (Cycle 1) through Cycle 7.
2. Subscript "T" indicates tests at Tropic Test Center only. Cycles "6T" and "7T" lag 1 month behind other sites in order to test during wettest and driest seasons.
3. A final "floating" cycle (Cycle 8) will be conducted after Cycle 7. This "floating" cycle will be scheduled on the basis of test results to that time and/or Military Characteristics.

Figure 1. Suggested Cyclic Test Schedule

Determine, and include in the test plan, the meteorological observations to be recorded during storage and the conduct of operational and functional tests listed in paragraph 6.2.7. The requirements shall be based on the physical and technical characteristics of the test item, the requirements expressed in the test item's QMR or other applicable directive. The following items shall be included in the plan, as applicable.

- a. Temperature
- b. Humidity (relative or absolute)
- c. Temperature gradient
- d. Atmospheric pressure
- e. Dew point
- f. Ozone measurements
- g. Precipitation
- h. Solar radiation
- i. Wind speed and direction
- j. Pibal data
- k. Frequency of data observations
- m. Data source (instrumentation)

6.2.5 Pre-Storage Tests

Within 30 days of the receipt of the test item, operational, functional and miscellaneous field tests, as determined in paragraph 6.2.7 shall be performed to:

- a. Establish a pre-storage performance record for use as criteria in checking satisfactory performance of the test item during and at the conclusion of the test.
- b. Provide data for determining the feasibility of continuing the test program, with the test items on hand, as planned.

- NOTE: 1. When operational tests require expenditure and destruction of the test item, and quantities of the test item furnished are so severely limited that destructive testing is impractical, results of operational tests conducted during the commodity engineering test shall be used as a data base for pretest performance.
2. Pre-storage tests are normally Cycle 1 of the cyclic schedule of paragraph 6.2.3.

6.2.6 Storage

The materiel shall be stored under conditions typical for storage of similar items in the climatic environment of the test site. Details of required storage conditions shall be determined based on the physical and technical characteristics of the test item, and requirements expressed in the QMR or other documentation and shall include, but not be limited to, pertinent information regarding:

- a. Outside Storage:

- 1) On ground (improved and unimproved), pallets, hardstand, or other base.
 - 2) Covered or uncovered (protected or unprotected); type of cover and protection if used.
 - 3) Ventilation.
- b. Inside Storage:
- 1) Type of warehouse, building, or shelter.
 - 2) On floor (hardstand), pallets, or shelves.
 - 3) Ambient air conditions (ventilation, heating, air conditioning, and humidity).
- c. Configuration of Test Items:
- 1) In shipping containers, intermediate packages, unit packages, or unpackaged.
 - 2) Stacking limitations, air space between items.
 - 3) Spatial orientation of test items during storage.
- d. Special precautions to be observed during storage and handling

6.2.7 Cyclic Inspections and Tests

NOTE: Cyclic inspections and tests shall be performed within a period of ± 15 days of scheduled dates of each cycle. Deviations from the schedule shall be explained if the actual date of test does not fall within the specified 30 day period (see paragraph 6.2.3).

- a. Specifically designed cyclic tests shall be conducted to insure that post storage reliability requirements (specified in approved QMR's, SDR's, and TC's) can be evaluated on the basis of resulting data.
- b. The particular evaluation methods and techniques to be employed shall be determined at the detailed test plan stage in coordination with a qualified reliability analyst.
- c. The procedures to be followed for inspections and tests during each scheduled test period shall be documented in detail according to the nature of the test item. The steps will generally parallel those used for the engineering test of the commodity, modified as required for determining long term environmental storage effects. The types of tests and inspections outlined in the following subparagraphs shall be included when applicable. Equipment features requiring special attention shall be specified and covered in a manner consistent with the physical and technical characteristics of the particular test item.
- d. Tests to determine operational reliability shall be as follows:

6.2.7.1 Visual Inspection

Shipping containers, intermediate packages, unit packages, and unit items shall be inspected for visual evidence of deterioration or damage attri-

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butable to environmental storage as described in the applicable sections of MTP 8-2-500.

6.2.7.2 Miscellaneous Field and Laboratory Tests

Special field and laboratory tests required by the nature of the particular test item shall be made when applicable. Examples of such tests include the following:

- a. Leak testing as described in MTP 8-2-511 and MTP 8-2-512.
- b. Pressure testing.
- c. Sampling and laboratory analysis.
- d. Air permeability and agent penetration of fabrics and materials (MTP 8-2-511).
- e. Effects of decontamination on the test item (MTP 8-2-510).
- f. Tests to determine stability of physical properties.
- g. Disassembly and sectionalizing.
- h. Radiography as described in MTP 8-2-509.

6.2.7.3 Operational Tests

a. End Items

Operational tests of end items simulating employment under conditions of intended use shall be conducted when applicable. Examples of operational tests include the following:

- 1) Firing of agent-filled or simulant-filled artillery and missile warheads.
- 2) Activation of ground chemical munitions.
- 3) Aerial drop of chemical and biological munitions.
- 4) Dispersion of aerosol from ground or aircraft disseminators.
- 5) Observation of dissemination and persistency characteristics of chemical and biological agents when employed as in 1), 2) 3), and 4) above.
- 6) Operation of decontaminating apparatus.
- 7) Operation of protective shelters.
- 8) Operation of rapid warning apparatus and detection devices.

b. Components

Tests to determine the effects of environmental storage on the functioning of components, assemblies, subassemblies, and individual parts shall be made as indicated by the characteristics of the particular test item. Examples of such tests include the following:

- 1) Agent detection effectiveness
- 2) Filter efficiency
- 3) Performance of engines, motors, blowers, pumps, and valves
- 4) Fuel consumption rate

5) Wearing tests of protective clothing and devices.

6.3 TEST DATA

6.3.1 Receipt Inspection

Data shall be recorded and collected as described in the applicable sections of MTP 8-2-500.

6.3.2 Graphic Presentation

Pictorial material and other graphic data shall be as stipulated in the plan of test for the particular commodity. Additional graphic material shall be included when considered necessary by the test officer.

6.3.3 Cyclic Schedule

The cyclic test schedule shall include the year, month, and days of the month scheduled for each test cycle and each test site. Actual dates of tests shall be recorded and deviations from the schedule explained.

6.3.4 Meteorological Data

Data shall be collected and recorded as stipulated in the test plan for the particular commodity undergoing tests.

6.3.5 Pre-Storage Tests

Record the following:

- a. Test item identification number.
- b. Operational and functional tests to be performed.
- c. Data collected as described in the visual, operational and/or functional tests stipulated in the test item's test plan.
- d. Failures and malfunctions identified by test item number.

6.3.6 Storage

Record the following:

- a. Place of storage (inside or outside)
- b. Conditions of storage (hardstand, covered; pallet, uncovered; etc.)
- c. Packing during storage (shipping containers, unpackaged, etc.)
- d. Stacking limitations (maximum height, space between stacks, etc.)
- e. Orientation during storage (top up, on side, etc.)

6.3.7 Cyclic Inspections and Tests

Record the following:

- a. Cycle number (1, 2, 5)

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b. Date of test (day, month, year)

6.3.7.1 Visual Inspection

Record the following:

- a. Item identification number
- b. Data collected as described in the applicable sections of MTP 8-2-500

6.3.7.2 Miscellaneous Field and Laboratory Tests

Record the following:

- a. Test item identification number.
- b. Data collected as described in the applicable sections of the following MTP's; as applicable:

- 1) Radiography data: MTP 8-2-509.
- 2) Decontamination data: MTP 8-2-510.
- 3) Leak testing data of:
 - a) Protective equipment: MTP 8-2-511
 - b) Agent-filled munitions and containers: MTP 8-2-512
- 4) Dissemination characteristic data of munitions and dissemination devices: MTP 8-2-513.

c. Data collected as described in specific tests stipulated in the test plan to evaluate specific characteristics peculiar to the test item.

6.3.7.3 Operational Tests

Record the following:

- a. Test item identification number.
- b. Operational/functional tests to be performed.
- c. Data collected as described in the operational/functional test being performed.
- d. Failures and malfunctions identified by test number.

6.4 DATA REDUCTION AND PRESENTATION

6.4.1 General

The results of surveillance/environmental tests and inspections shall be presented in a form which is appropriate relative to the test item and test criteria. Photographs, motion pictures, radiographs, and other graphic material shall be included when appropriate.

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6.4.2 Operational Reliability

Data collected in accordance with paragraph 6.2.7 shall be submitted to a qualified reliability analyst for evaluation. These evaluated data shall be presented in a convenient form.

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GLOSSARY

1. Safety Statement: A statement issued by the developing agency which includes information pertaining to operational limitations peculiar to the systems or components tested.